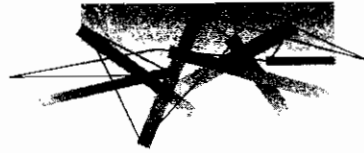


Coalition of
Academic
Supercomputing
Centers

C A S C



NEW FACES OF NETWORKING

Among the most persuasive arguments for on-going federal support of pre-commercial R&D in high performance computing is the leadership role the United States has played in developing the Internet -- the high speed global communications network that is rapidly transforming our businesses, our schools, our lives. According to some industry predictions, by the year 2000 traffic on the Internet will exceed traffic on ordinary telephone lines. At present growth trends 100 million computers worldwide will be connected to it by the turn of the century.

While computer companies are rapidly producing hardware and software to meet the demands of this burgeoning market, it must not be forgotten that today's Internet is the outgrowth of work started well over a decade ago by tenacious university researchers who, with federal support, were pushing the limits of high performance computing. Without their momentum the Internet would probably not have developed first in the U.S. and the country would not enjoy the leadership position in networking technology that it has today.

The academic supercomputing community continues to play a central role in networking advances -- from efforts to make the Internet faster and more efficient, to reducing traffic and congestion, and providing better organization for the vast amount of information that is accumulating on the World Wide Web. Academic supercomputing centers and national research labs are also partners in the development of new ultra-high speed networks and advanced networking applications geared toward scientific research. As a result of these efforts, scientists and engineers will be able to work on complex high performance computing problems nationally and even globally without having to compete with the average PC user for access to the Internet.

StarTap -- CASC Centers are participating in this National Science Foundation funded effort to provide connectivity between the vBNS -- the new U.S. high speed research network -- and similar experimental networks in other countries. The first ***StarTap*** switch point enabling international networks to connect with U.S. networks has been created in Chicago. The National Center for Supercomputer Applications (NCSA) is at the helm of this effort, with the University of Illinois at Chicago as lead institution. Other CASC members are also developing advanced technologies to expand ***StarTap's*** reach and new applications to facilitate its use. Since major scientific investigations often involve international colleagues, the potential for global cooperation in the advancement of science is enormous. It will enable researchers to perform "global metacomputing" -- to work cooperatively and concurrently on the same scientific problems and computational tasks despite geographic barriers. It will also provide access to shared virtual reality environments, massive datasets and other previously inaccessible resources. The Human Genome Project, with branches in America and abroad, is one example of the kind of collaboration that can benefit from such connectivity. (www.startap.net)

Alabama Supercomputing Authority
Huntsville, Alabama

Arctic Region Supercomputing Center
Fairbanks, Alaska

Arizona State University
Tempe, Arizona

Boston University Center
for Computational Science
Boston, Massachusetts

Center for Advanced Computing Research
Caltech
Pasadena, California

Center for Computational Sciences
Lexington, Kentucky

ORNL Center for Computational Sciences
Oak Ridge, Tennessee

Center for Innovative Computer
Applications at Indiana University
Bloomington, Indiana

Center for Research on
Parallel Computation
Houston, Texas

Cornell Theory Center
Ithaca, New York

High Performance Computing
Education and Research
Albuquerque, New Mexico

National Center for
Atmospheric Research
Boulder, Colorado

National Center for Supercomputing
Applications at UIUC
Champaign, Illinois

National Energy Research
Scientific Computing Center
Berkeley, California

National Supercomputer Center
for Energy and Environment
Las Vegas, Nevada

North Carolina Supercomputing
Center at MCNC
Research Triangle Park, North Carolina

Ohio Supercomputer Center
Columbus, Ohio

Pittsburgh Supercomputing Center
Pittsburgh, Pennsylvania

Purdue University
West Lafayette, Indiana

San Diego Supercomputer Center
San Diego, California

Supercomputer Computations
Research Institute
Tallahassee, Florida

Texas A&M University
Supercomputer Center
College Station, Texas

Texas Advanced Computing Center
Austin, Texas

The Pennsylvania State University
University Park, Pennsylvania

University of Florida
Gainesville, Florida

University of Maryland
College Park, Maryland

University of Southern California
Information Sciences Institute
Marina del Rey, California

University of Utah, Center
for High Performance Computing
Salt Lake City, Utah

University of Wisconsin
Madison, Wisconsin

Internet 2 -- More than 110 U.S. research universities, including the CASC Centers are participants in this partnership with private industry and federal networking initiatives, such as the Next Generation Internet initiative. The mission of Internet2 is to facilitate the development of "next generation" Internet technology and to design applications that advance higher education and promote scientific research. This includes creating the broad-band applications and providing the engineering and network management to support new directions in distance learning, collaborative long-distance research, digital libraries, and other resources that can be accessed from desktop computers anywhere on a campus, or for that matter, anywhere in the country.

Internet2 members and CASC Centers are also working closely with the five federal agencies involved in NGI to create technology and applications for a new high performance research network that is many times faster than today's Internet-- one over which data-intensive and computationally demanding work not possible on the current interconnection can be performed. The University Corporation for Advanced Internet Development (UCAID) was recently established as a permanent organization to support the efforts of Internet2 members. (www.internet2.edu)

Community Health Information Network (CHIN) -- Researchers at the Oak Ridge National Laboratory (ORNL) are testing the feasibility of creating a high speed regional information network for hospitals, clinics and health care providers in the Knoxville, Tennessee metropolitan area. Data management tools are being developed to enable rapid access to patient histories, lab results, and medical images such as scans and x-rays, giving physicians a complete health profile without needless delays or repetitive testing. The storage and networking requirements for such a system are enormous and an interconnection between the University of Tennessee and ORNL is providing the infrastructure for testing its efficacy. Any system that allows for the sharing of medical information must also be designed to ensure a secure computing environment that guarantees absolute patient confidentiality and consent. This is among the key challenges. If successful, this CHIN will serve as a prototype for other communities.

National Laboratory for Applied Network Research (NLANR) -- Since 1995, under a cooperative agreement with the National Science Foundation (NSF), the University of California, San Diego (UCSD) and five CASC-affiliated supercomputing centers have been providing technical and engineering support and overall coordination for the NSF/MCI very high speed Backbone Network Service (vBNS). This is, in essence, the technological skeleton of the new ultra-fast research network now being developed to serve the scientific community. During the coming year the NLANR will play an increasingly important role in supporting NSF's new ultra-high performance computing connections sites, including conducting network traffic measurement and research and providing engineering and user support to institutions interested in being connected to or running applications over the vBNS.

Internet Bridges -- The San Diego Supercomputer Center, Spring Communications and Minnesota Supercomputer Center joined forces to design and manage the Pennsauken, New Jersey Network Access point (NAP), one of the four NAPs established by the National Science Foundation to ensure universal connectivity, as the Internet moves from a government and academic infrastructure to the commercial marketplace. NAPs are critical for the global connectivity that Internet users take for granted. Just as airports allow passengers to reach their destinations by making connections between airlines, NAPs allow connections to be made between Internet Service Providers (ISPs), their customers and the resources they seek. Today approximately 30 ISPs interconnect at the Pennsauken point, and up to 800 megabits of data per second pass through it -- that is 800 million bits of data per second. To give some idea of the magnitude, one floppy disk holds up to 12 megabits of data.